



**Appendix D**  
**Table 1: Chlorhexidine Gluconate – Healthcare Personnel Handwash Studies**

Formulation	Test Subjects	S. marcescens				Wash Vol.	Wash Time <sup>1</sup>	Rinse Time	Massage Time	Neutral-ization <sup>2,3</sup>	Statist. Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

4% CHG Bartzokas <i>et al.</i> 1987	12	6.63	2.5 mL + 2.5 mL	45 sec	1 min	3 mL	30 sec	30 sec	1 min	Media	-	2.61 ±0.33 p<0.1	3.41 ±0.37 p<0.01	3.95 ±0.29 p<0.01	4.15 ±0.34 p<0.05
4% CHG Ciba 1990	12	7.07	2.5 mL + 2.5 mL	45 sec	1 min	3 mL	30 sec	30 sec	1 min	Media	NA	2.51 ±0.26	3.09 ± 0.13	3.37 ±0.18	3.92 ± 0.28
4% CHG Purdue Fred. 1986	9	NA	5 mL	To coat	1 min	5 mL	15 sec	NA	1 min	Media	NA	2.050	2.563	2.696	3.289
4% CHG Hibiclens Purdue Fred. 1986	9	NA	5 mL	To coat	1 min	5 mL	15 sec	NA	1 min	Media	NA	1.629	2.097	2.501	3.115
4% CHG Steris 1995	18	7.96	NA	NA	NA	5 mL	30 sec	NA	NA	Media	p ≤ 0.005	2.26	3.43	4.23	4.62
4% CHG Hibiclens Huntington 1994	6	6.356	6 mL	To coat	1 min	5 mL	30 sec	NA	1 min	Media	NA	NA	99.9921% Wash 5	NA	99.9949% Wash 5

## Appendix D

**Table 1: Chlorhexidine Gluconate – Healthcare Personnel Handwash Studies (continued)**

Formulation	Test Subjects	S. marcescens				Wash Vol.	Wash Time <sup>1</sup>	Rinse Time	Massage Time	Neutral-ization <sup>2,3</sup>	Statist. Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

4 % CHG Huntington 1994	6	6.356	6mL	To coat	1 min	5 mL	30 sec	NA	1 min	Media	NA	NA	99.982% Wash 5	NA	99.9997%
4% CHG Ballard, 1985	6	7.776	5 mL	NA	1 min	5 mL	15 sec	NA	1 min	Media	p<0.05	2.050	2.563	2.696	3.289
4% CHG Ballard, 1985	6	7.776	5 mL	NA	1 min	5 mL	15 sec	NA	1 min	Media	p<0.05	1.882	2.389	2.770	3.307
4% CHG (Hibiclens) Ballard, 1985	6	7.776	5 mL	NA	1 min	5 mL	15 sec	NA	1 min	Media	p<0.05	1.629	2.097	2.501	3.115
4% CHG Stiles & Sheena 1987	4	3.80	NA	NA	NA	NA	15 sec	15-20 sec	NA	Media	NA	2.52	NA	NA	NA
4% CHG Hibiclens Stuart Pharmaceuticals 1986 ICI 1976	36	NA	NA	NA	NA	NA	15 sec	NA	NA	NA	NA	NA	3.85	NA	4.2649
4% CHG Hibiclens Stuart Pharmaceuticals 1986 ICI 1976	36	NA	NA	NA	NA	NA	30 sec	NA	NA	NA	NA	NA	3.6928	NA	4.3192

## Appendix D

### Table 1: Chlorhexidine Gluconate – Healthcare Personnel Handwash Studies (continued)

Formulation	Test Subjects	<i>S. marcescens</i>				Wash Vol.	Wash Time <sup>1</sup>	Rinse Time	Massage Time	Neutral-ization <sub>2,3</sub>	Statist. Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

4% CHG Ciba-Geigy 1990	12	NA	NA	NA	NA	3 mL	30 sec	NA	NA	NA	NA	~2.5	~3.2	~3.4	~3.9
4% CHG Ballard 1996	36	NA	NA	NA	1 min	5 mL	30 sec	NA	1 min	NA	NA	NA	3.37 Wash 5	NA	3.84
4% CHG The Dial Corporation Undated	NA	8.46	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.44	4.43	4.58	4.79
4% CHG (Hibiclens) The Dial Corporation Undated	NA	8.46	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.78	3.63	3.89	4.22
4% CHG Gojo 1999	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.65%	99.2%	99.68%	99.92%
4% CHG Peterson <i>et al.</i> 1978	36	8.07	NA	NA	NA	5 mL	15 sec	NA	NA	NA	NA	NA	4.32 Wash 5	NA	5.49



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### Table 1: Chlorhexidine Gluconate – Healthcare Personnel Handwash Studies (continued)

Formulation	Test Subjects	S. marcescens				Wash Vol.	Wash Time <sup>1</sup>	Rinse Time	Massage Time	Neutral-ization <sup>2,3</sup>	Statist. Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

4% CHG Jampani <i>et al.</i> 1998	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.97	NA	NA	2.77
4% CHG Hibiclens Paulson 1994	36	6.8363	NA	NA	NA	5 mL	15 sec	NA	NA	NA	NA	NA	3.85 Wash 5	NA	4.2649
4% CHG Sheena & Stiles 1983 <sup>4</sup>	NA	2.90	NA	5 sec, until dry		5 mL	15 sec	NA	NA	NA	NA	1.60	NA	NA	NA
4% CHG Sheena & Stiles 1983 <sup>4</sup>	NA	2.81	NA	5 sec, until dry		5 mL	15 sec + 15 sec	NA	NA	NA	NA	NA	1.81 Day 3, Wash 6	NA	NA
4% CHG Hibiclens Stuart Pharmaceuticals 1986	16	NA	6 mL	NA	1 min	15 sec	NA	NA	NA	NA	NA	~3.2	~4.8 Wash 5	NA	~5.43
4% CHG The Dial Corporation Undated	NA	7.901 (left hand)	NA	NA	1 min	NA	NA	NA	NA	NA	p<0.01	NA	4.639 Wash 5	NA	4.080
4% CHG The Dial Corporation Undated	NA	7.969 (right hand)	NA	NA	1 min	NA	NA	NA	NA	NA	P<0.01	NA	4.494 Wash 5	NA	4.102

## Appendix D

### Table 1: Chlorhexidine Gluconate – Healthcare Personnel Handwash Studies (continued)

Formulation	Test Subjects	<i>S. marcescens</i>				Wash Vol.	Wash Time <sup>1</sup>	Rinse Time	Massage Time	Neutral-ization <sub>2,3</sub>	Statist. Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

4% CHG Ciba-Geigy 1995	12	8.46	5 mL	45 sec	2 min	5 mL	15 sec	30 sec	NA	Glove (Wash 10)	NA	1.97	2.88 Wash 3	3.46	2.77
4% CHG Billhimer <i>et al.</i> 1998	11	7.3±0.20	50g ground beef	NA	1 min	NA	30 sec	NA	1 min	Glove	NA	3.3 ±0.89 <sup>5</sup>	NA	NA	NA
4% CHG Stiles & Sheena 1985	NA	3.78	Contam - inated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.001	1.88	NA	NA	NA
4% CHG Stiles & Sheena 1985	NA	2.32	Contam - minated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.01	0.28	NA	NA	NA
4% CHG Ciba 1995	12	8.32	5 mL	45 sec	2 min	5 mL	15 sec	30 sec	NA	Wash 1: Media Wash10: Glove	p<0.05	2.16	2.56	3.04	2.93
4% CHG Jampani <i>et al.</i> 1998	9*	NA	5 mL	45 sec	Air dry	5 mL	15 sec	30 sec	1 min	Wash 1: Media Wash10: Glove	P<0.05	1.92	NA	NA	2.84
4% CHG Ciba 1995	12	8.46	5 mL	45 sec	2 min	5 mL	15 sec	30 sec	NA	Wash 1: Media Wash10: Glove <sup>3</sup>	p<0.05	1.97	2.88	3.46	2.77

## Appendix D

### Table 1: Chlorhexidine Gluconate – Healthcare Personnel Handwash Studies (continued)

Formulation	Test Subjects	S. marcescens				Wash Vol.	Wash Time <sup>1</sup>	Rinse Time	Massage Time	Neutral-ization <sup>2,3</sup>	Statist. Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

2% CHG Peterson 1978	36	8.07	NA	NA	NA	5 mL	15 sec	NA	NA	Media	NA	NA	NA	NA	5.49
2% CHG Stiles & Sheena 1987	4	3.81	NA	NA	NA	NA	15 sec	15-20 sec	NA	Media	NA	2.39	NA	NA	NA
2% CHG Gojo 1999	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.69%	99.59%	99.83%	99.95%
2% CHG Huntington 1992	NA	6.27	NA	NA	NA	NA	30 sec	NA	NA	NA	NA	NA	4.0 Wash 5	NA	4.0
2% CHG Ballard, 1998	NA	18.5	NA	NA	NA	5 mL	30 sec	NA	1 min	NA	NA	NA	99.99% Wash 5	NA	99.99%
2% CHG Stiles & Sheena 1985	NA	3.78	Contam - inated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.001	1.48	NA	NA	NA
2% CHG Stiles & Sheena 1985	NA	2.38	Contam - inated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.01	0.10	NA	NA	NA
2.0% CHG Johnson 1998	9	8.40±0.25	5 mL	45 sec	Air dry	5 mL	15 sec	30 sec	1 min	Wash 1: Media Wash10: Glove	p<0.05	1.92 ±0.52	NA	NA	2.84 ±0.4

## Appendix D

### Table 1: Chlorhexidine Gluconate – Healthcare Personnel Handwash Studies (continued)

Formulation	Test Subjects	<i>S. marcescens</i>				Wash Vol.	Wash Time <sup>1</sup>	Rinse Time	Massage Time	Neutralization <sup>2,3</sup>	Statist. Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

0.75% CHG Steris 1998	18	7.96	NA	NA	NA	5 mL	30 sec	NA	NA	Media	p≤0.005	2.07	2.98	3.92	4.22
CHG *Kaiser <i>et al.</i> 2000	18	NA	NA	NA	NA	NA	NA	NA	NA	Media	NA	2.0	NA	NA	3.3

1. The indication "15 sec + 15 sec" indicates that an initial wash time was used to wash the hands followed by a subsequent wash.
  2. The term "Media" indicates that the neutralizers were incorporated into the dilution and plating media only.
  3. The term "Glove" indicates that the neutralizers were incorporated into the sampling fluid in the glove.
  4. *E. coli* inoculated on hands through artificially contaminated ground beef.
  5. Results were tested with water rinse.
  6. Results were with out water rinse.
- Log reduction values below the 1994 TFM criteria indicated by a shaded box and heavy outline.
- \* Study not included in tally tables.

**Appendix D**  
**Table 2: Alcohol – Healthcare Personnel Handwash Studies**

Formulation	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time	Massage Time	Neutral-ization <sup>2,3</sup>	Statistical Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time						Wash No.			
											1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

60% Ethanol Johnson 199 c	11	NA	5 mL	45 sec	2 min	5 mL	NA	1 min	Glove	NA	2.97	NA	NA	2.74
60% ethanol Jones <i>et al.</i> 2000	10	8.76±0.28	1.5 mL + 1.5 mL + 1.5 mL	1 min	3 min	5 mL	45-75 sec	1 min	Wash 1: Media Wash 10: Glove	NA	2.97 ±0.36	NA	NA	2.74 ±0.69
60% ethanol Johnson Wax Undated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	~1.8	NA	NA	NA
60% ethanol Johnson Wax Undated	NA	7.74	NA	NA	NA	NA	NA	NA	NA	NA	~2.5	~1.92 Wash 3	~2.0	~2.0
60% ethanol SDA/CTFA 1995	NA	NA	NA	NA	NA	NA	10 sec	NA	NA	NA	3.49-3.53 Wash 2	NA	NA	NA
60% ethanol SDA/CTFA 1995	NA	NA	NA	NA	NA	5 mL	To dry	NA	NA	NA	2.91	3.53	3.94	3.93
60% ethanol SDA/CTFA 1995	NA	NA	NA	NA	NA	5 mL	To dry	NA	NA	NA	1.83	1.91 Wash 5	NA	2.38
60% ethanol SDA/CTFA 1995	NA	NA	NA	NA	NA	5 mL	To dry	NA	NA	NA	1.56	2.23 Wash 5	NA	2.64

**Appendix D**  
**Table 2: Alcohol – Healthcare Personnel Handwash Studies**

Formulation	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time	Massage Time	Neutral-ization <sub>2,3</sub>	Statistical Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time						Wash No.			
											1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

62% alcohol Johnson & Johnson Medical 2000	12	NA	5 mL	45 sec	1 min	5 mL	Rub until dry	1 min	Glove Wash 10	NA	3.04	NA	NA	2.72
62% Ethanol Kimberly-Clark 1999	NA	4.09	1.5 mL + 1.5 mL + 15 mL	20 sec	1 min	5 mL + 2.5 mL	NA	1 min	NA	NA	3.83	2.84 Wash 3	2.68	2.86
62% Ethanol Kimberly-Clark 1999	NA	4.09	1.5 mL + 1.5mL + 1.5 mL	20sec	1 min	5 mL+ 2.5 mL	NA	1 min	NA	NA	3.93	3.59 Wash 3	3.49	3.74
62% Ethanol Gojo 1999	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.86%	99.74% Wash 3	98.45%	98.77%
62% Ethanol Paulson <i>et al.</i> 1999	25	3.99	5 mL	NA	1 min	3 mL	NA	1 min	Media	NA	3.9 ±0.04	3.79 ±0.15	2.96 ±0.17	2.15 ±0.13
62% ethanol Dyer <i>et al.</i> 1998	17	NA	5 mL	45 sec	2 min	5 g	NA	1 min	Media	p0.05	~2.8	~2.8 Wash 3	~2.7	~2.4
62% ethanol Dyer <i>et al.</i> 1998	16	NA	5 mL	45 sec	2 min	5 g	NA	1 min	Media	p0.05	~2.0	~1.8 Wash 3	~1.5	~1.7

## Appendix D

### Table 2: Alcohol – Healthcare Personnel Handwash Studies

Formulation	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time	Massage Time	Neutral -ization <sup>2,3</sup>	Statistical Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time						Wash No.			
											1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

62% ethanol Paulson <i>et al.</i> 1999	5	7.98±0.27	5 mL	NA	1 min	3 mL	Air dry 5 min	1 min	Media	NA	3.93 ±0.04	3.79 ±0.15 Wash 3	2.96 ±0.17	2.15 ±0.13
62% ethanol Paulson 1994	5	7.98±0.27	5 mL	1 min	1 min	3 mL	Rub in, dry 5 min	1 min	Media	p<0.05	3.93 ±0.04	3.79 ±0.16	2.96 ±0.17	2.16 ±0.13
70% Ethanol Huntington 1995	6	8.10	5 mL	NA	2 min	3.5 mL	NA	1 min	Media	NA	2.59	2.07	1.96	1.97
70% ethanol Dyer <i>et al.</i> 1998	5	NA	5 mL	45 sec	2 min	5 g	NA	1 min	Media	p0.05	~2.8	~2.0 Wash 3	~1.5	~1.3
70% ethanol Dyer <i>et al.</i> 1998	5	NA	5 mL	45 sec	2 min	5 g	NA	1 min	Media	p0.05	~2.5	~2.5 Wash 3	~2.3	~2.0
70%IPA Aly & Maibach 1980	36	5.94	NA	NA	NA	NA	NA	NA	NA	p>0.20	NA	1.68 Wash 5	NA	1.6 Wash 10
80% ethanol SDA/CTFA 1995 a	NA	NA	NA	NA	NA	5 mL	To dry	NA	NA	NA	2.27	2.88 Wash 5	NA	1.94
Alcohol Kaiser <i>et al.</i> 2000	12	NA	NA	NA	NA	NA	NA	NA	Media	NA	2.0	NA	NA	2.3

## Appendix D

### Table 2: Alcohol – Healthcare Personnel Handwash Studies

Formulation	Test Subjects	<i>S. marcescens</i>				Wash Vol. <sup>1</sup>	Wash Time	Massage Time	Neutral-ization <sub>2,3</sub>	Statistical Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time						Wash No.			
											1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

Ethanol (Alcare Foam) SDA/CTFA 1995 a	36	8.27±0.18	6 mL	NA	60 sec	7 g	Rub until dry (~60 sec)	1 min	Media	NA	NA	3.30 Wash 5	NA	3.46
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1 The indication "5.0 mL + 2.5 mL" indicates that two additions of test material were used to reduce the loss through the subject's fingers.

2 The term "Media" indicates that the neutralizers were incorporated into the dilution and plating media only.

3 The term "Glove" indicates that the neutralizers were incorporated into the sampling fluid in the glove.

Log reduction values below the 1994 TFM criteria indicated by a shaded box



## Appendix D

### Table 3: Povidone-Iodine – Healthcare Personnel Handwash Studies

Formulation	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time	Massage Time	Neutral-ization <sub>3,4</sub>	Statistical Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time						Wash No.			
											1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

0.75% available I <sub>2</sub> Sheena & Stiles 1983 <sup>1</sup>	NA	2.80	NA	5 sec	Until dry	5 mL	15 sec	NA	NA	NA	NA	1.79	NA	NA	NA
0.75% available I <sub>2</sub> Sheena & Stiles 1983 <sup>1</sup>	NA	2.56	NA	5 sec	Until dry	5 mL	15 sec	NA	NA	NA	NA	NA	1.56 <sup>2</sup> Day 3, Wash 6	NA	NA
0.005% available I <sub>2</sub> Sheena & Stiles 1983 <sup>1</sup>	NA	2.99	NA	5 sec	Until dry	5 mL	15 sec	NA	NA	NA	NA	1.38	NA	NA	NA
0.005% available I <sub>2</sub> Sheena & Stiles 1983 <sup>1</sup>	NA	2.76	NA	5 sec	Until dry	5 mL	15 sec	NA	NA	NA	NA	NA	1.76 <sup>2</sup> Day 3, Wash 6	NA	NA
25 ppm available I <sub>2</sub> Sheena & Stiles 1983 <sup>1</sup>	NA	3.04	NA	5 sec	Until dry	5 mL	15 sec	NA	NA	NA	NA	1.34	NA	NA	NA
25ppm available I <sub>2</sub> Sheena & Stiles 1983 <sup>1</sup>	NA	2.92	NA	5 sec	Until dry	5 mL	15 sec	NA	NA	NA	NA	NA	1.62 <sup>2</sup> Day 3, Wash 6	NA	NA

## Appendix D

### Table 3: Povidone-Iodine – Healthcare Personnel Handwash Studies (continued)

Formulation	Test Subjects	<i>S. marcescens</i>				Wash Vol.	Wash Time	Rinse Time	Massage Time	Neutral-ization <sub>3,4</sub>	Statistical Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

7.5% PVP-I Peterson <i>et al.</i> 1978	36	7.83	NA	NA	NA	5 mL	15 sec	NA	NA	NA	NA	NA	3.78 Wash 5	NA	3.89 Wash 10
0.75% PVP-I Stiles & Sheena 1985	NA	3.82	Contaminated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.001	2.12	NA	NA	NA
0.5% PVP-I Stiles & Sheena 1985	NA	3.71	Contaminated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.001	1.71	NA	NA	NA
0.3% PVP-I Stiles & Sheena 1985	NA	3.80	Contaminated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.001	1.50	NA	NA	NA
0.1% PVP-I Stiles & Sheena 1985	NA	3.79	Contaminated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.001	1.79	NA	NA	NA
0.01% PVP-I Stiles & Sheena 1985	NA	2.11	Contaminated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.001	1.50	NA	NA	NA

## Appendix D

### Table 3: Povidone-Iodine – Healthcare Personnel Handwash Studies (continued)

Formulation	Test Subjects	S. marcescens				Wash Vol.	Wash Time	Rinse Time	Massage Time	Neutral-ization <sub>3,4</sub>	Statistical Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

0.75% PVP-I Stiles & Sheena 1985	NA	2.11	Contaminated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.01	0.16	NA	NA	NA
0.5% PVP-I Stiles & Sheena 1985	NA	2.18	Contaminated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.01	0.13	NA	NA	NA
0.3% PVP-I Stiles & Sheena 1985	NA	2.34	Contaminated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.01	0.20	NA	NA	NA
0.1% PVP-I Stiles & Sheena 1985	NA	2.11	Contaminated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.01	+0.14	NA	NA	NA
0.01% PVP-I Stiles & Sheena 1985	NA	2.28	Contaminated ground beef	5 sec	Until dry	5 mL	15 sec	15 sec	NA	Glove	p<0.01	0.02	NA	NA	NA
0.02% Available I <sub>2</sub> Stiles & Sheena 1987	4	3.72	NA	NA	NA	NA	15 sec	15-20 sec	NA	Media	NA	2.10	NA	NA	NA

## Appendix D

**Table 3: Povidone-Iodine – Healthcare Personnel Handwash Studies (continued)**

Formulation	Test Subjects	<i>S. marcescens</i>				Wash Vol.	Wash Time	Rinse Time	Massage Time	Neutral-ization <sub>3,4</sub>	Statistical Signif. vs. baseline	Log Reduction (Versus Baseline)			
		Baseline (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

  

0.12% Available I <sub>2</sub> Stiles & Sheena 1987	4	3.88	NA	NA	NA	NA	15 sec	15-20 sec	NA	Media	NA	2.22	NA	NA	NA
0.75% Available I <sub>2</sub> Stiles & Sheena 1987	4	3.81	NA	NA	NA	NA	15 sec	15-20 sec	NA	Media	NA	2.70	NA	NA	NA
I <sub>2</sub> Kaiser <i>et al.</i> 2000	7	NA	NA	NA	NA	NA	NA	NA	NA	Media	NA	3.5	NA	NA	4.0
7.5% PVP-I Rotter 1984	15	NA	NA	NA	NA	NA	1 min	NA	NA	Media	NA	3.2 ±0.5	NA	NA	NA

1 *E. coli* inoculated onto hands through artificially contaminated ground beef.

2 Two (2) consecutive washes

3 The term "Media" indicates that the neutralizers were incorporated into the dilution and plating media only.

4 The term "Glove" indicates that the neutralizers were incorporated into the sampling fluid in the glove.

Log reduction values below the 1994 TFM criteria indicated by a shaded box.

## Appendix D

### Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutral-ization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0

  

4% CHG Hibiclens <i>Peterson et al. 1978</i>	36	6.38 6.41	5 mL + 5 mL	3 min + 3 min	NA	Media	Below Baseline	3.64	3.89	4.11
4% CHG Huntington 1994	7	6.9263	5 mL + 5 mL	1 min + 3 min	1 min	Media	Below Baseline	2.5317	2.7833	2.8057
4% CHG Hibiclens Huntington 1994	6	6.8993	5 mL + 5 mL	3 min + 3 min	1 min	Media	Below Baseline	1.50	2.07	2.95
4% CHG Purdue Frederick 1985	12	5.0/hand	5 mL + 5 mL	3 min + 3 min	1 min	Plating Media Only	Below Baseline	2.80 p=0.001	3.17 p=0.001	4.18 p=0.001
4% CHG Hibiclens Purdue Frederick 1985	12	5.0/hand	5 mL + 5 mL	3 min + 3 min	1 min	Plating Media Only	Below Baseline	0.00 p=0.001	0.88 p=0.001	1.33 p=0.001
4% CHG Hibiclens Aly and Maibach 1988	13	>6.0	NA (Sponge /brush)	2 min	1 min	Media	Below Baseline	~1.5	~3.0	~4.0
4% CHG Loeb et al. 1997	15	3.47 (1.4-5.05)	15 mL	5 min w/scrub brush	1 min	Media	Below Baseline at 45 min	2.98 (-0.07-4.15)	NA	NA

**Appendix D**  
**Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutral-ization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0

4% CHG Loeb <i>et al.</i> 1997	15	3.45 (1.85-4.72)	15 mL	5 min no scrub brush	1 min	Media	Below Baseline at 45 min (-0.50-3.88)	3.09 1.80-3.95	NA	NA
4% CHG Mulberry <i>et al.</i> 2000	24	6.4	5 mL+ 5 mL	3 min+ 3 min	1 min	Media	Below Baseline	1.8	2.6	3.7
4% CHG Mulberry <i>et al.</i> 2000	19	6.0	5 mL+ 5 mL	3 min+ 3 min	1 min	Media	Below Baseline	1.6	2.4	3.6
4% CHG Brush Paulson 1994	6	6.57	NA	2 min	1 min	Media	Below Baseline	3.52	2.94	4.67
4% CHG Johnson & Johnson Medical 2000	11	NA	5 mL + 5 mL	6 min + 6 min	1 min	Media	Below Baseline	2.32	2.62	3.17
4% CHG Johnson & Johnson Medical 2000	12	NA	5 mL + 5 mL	3 min + 3 min	1 min	Media	Below Baseline	2.37	3.30	3.12
4% CHG Johnson & Johnson Medical 2000	9	NA	5 mL + 5 mL	6 min + 6 min	1 min	Media	Below Baseline	2.10	2.60	3.08

**Appendix D**  
**Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutralization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0

4% CHG Johnson & Johnson Medical 2000	12	NA	5 mL + 5 mL	3 min + 3 min	1 min	Media	Below Baseline	2.28	3.15	3.59
4% CHG Rotter 1984	16	NA	NA	1 min	NA	Media	NA	3.0 ±0.5	NA	NA
4% CHG Ciba-Geigy 1990	15	NA	5 g	30 sec	NA	NA	Below Baseline at 3 hr	~0.87	NA	~0.92
4% CHG (Hibiclens) Johnson Wax Undated	NA	NA	Per label directions	Per label directions	NA	NA	Below Baseline	~0.9	~1.6	~2.4
4% CHG The Dial Corporation Undated	NA	6.40	Per label directions	3 min+ 3 min	NA	NA	Below Baseline	3.13	3.80	4.64
4% CHG The Dial Corporation Undated	NA	NA	Per label directions	Per label directions	NA	NA	Below Baseline	2.30	3.75	4.70

**Appendix D**  
**Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutralization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0

4% CHG (Hibiclens) The Dial Corporation Undated	NA	NA	NA	NA	NA	NA	Below Baseline at 2 hr	3.32	NA	NA
4% CHG FOAM **Ballard, 1996	18	NA	5 mL + 5 mL	3 min + 3 min	1 min	NA	Below Baseline	1.31	1.76	2.79
4% CHG FOAM **Ballard, 1996	18	NA	5 mL + 5 mL	3 min + 3 min	1 min	NA	Below Baseline	2.06	2.65	3.57
4% CHG Hibiclens **Ballard, 1996	18	NA	5 mL + 5 mL	3 min + 3 min	1 min	NA	Below Baseline at 2 hr	3.32	NA	NA
4% CHG FOAM **Ballard, 1996	18	NA	5 mL + 5 mL	3 min + 3 min	1 min	NA	Below Baseline at 2 hr	3.63	NA	NA
4% CHG Jampani <i>et al.</i> 1998	NA	NA	NA	NA	NA	NA	Below Baseline	2.37	3.3	3.12
4% CHG Hibiclens Rosenberg <i>et al.</i> 1976	30	6.3707	5 mL + 5 mL	6 min	NA	NA	Below Baseline	1.9398	2.5371	2.6885



**Appendix D**  
**Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutralization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0
4% CHG Hibiclens Stuart Pharmaceuticals 1986	10	NA	NA	6 min	NA	NA	Below Baseline	1.9398	2.5371	2.6885
4% CHG Hibiclens Stuart Pharmaceuticals 1986	42	6.3963	NA Sponge brush	3 min+ 3 min	NA	NA	Below Baseline	1.7363	2.206	3.0603
4% CHG (Hibiclens) The Dial Corporation Undated	NA	NA	Per label directions	Per label directions	NA	NA	Below Baseline	1.95	2.80	4.25
4% CHG The Dial Corporation Undated	NA	NA	NA	NA	NA	NA	Below Baseline at 2 hr	3.63	NA	NA

**Appendix D**  
**Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutralization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0

4% CHG Hibiclens Aly and Maibach 1983	13	>6.0	NA (Sponge/ brush)	3 min + 3 min	1 min	Glove	Below Baseline at 2 hr	1.8887	2.9744	3.7860
4% CHG Babb <i>et al.</i> 1991	27	NA	5 mL + 5 mL	3 min	NA	Glove	Below Baseline at 3 hr	0.35	NA	NA
4% CHG Babb <i>et al.</i> 1991	27	NA	5 mL + 5 mL	3 min	NA	Glove	Below Baseline at 3 hr	0.48	NA	NA
4% CHG Babb <i>et al.</i> 1991	27	NA	5 mL + 5 mL	3 min	NA	Glove	Below Baseline at 3 hr	1.01	NA	NA
4% CHG Larson <i>et al.</i> 1990	12	5.80±0.58	5 mL+ 5 mL	5 min	1 min	Glove	Below Baseline	0.86	NA	1.56
4% CHG Lowbury <i>et al.</i> 1974	NA	NA	5 mL+ 5 mL	~2 min	NA	Glove	Below Baseline at 3 hr	87.1% ±3.5	NA	NA
4% CHG Larson & Bobo 1992	12	5.32±0.49	5 mL	15 sec	NA	Glove	NA	0.57	NA	NA
4% CHG Rotter 1984	16	NA	NA	1 min	NA	Glove	NA	4.8 ±0.5	NA	NA

**Appendix D**  
**Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutralization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0
4% CHG Larson <i>et al.</i> 2001	25	4.41 – 5.15	Sponge	3 min + 3 min	1 min	Glove	NA	0.81	NA	0.73
4% CHG Reverdy <i>et al.</i> 1984	10	6.47±0.39	5 mL + 5 mL	1 min + Rub until dry	5 min	Glove	NA	0.80 (Aerobic bacteria)	NA	NA
4% CHG Morrison <i>et al.</i> 1986	10	4.5-4.6 ±0.10-0.12	2 mL	10 sec (Wash 4, 1 min)	5 sec	Glove	NA	0.19	0.21* Week 2/ Wash 2	0.25* Week 3/ Wash 3
4% CHG Hibiclens Larson <i>et al.</i> 1986	10	7.02	5 mL	15 sec	1 min	Glove	NA	1.09	NA	NA
4% CHG Butz <i>et al.</i> 1990b	12	5.760±0.726	3 mL	15 sec	1 min	Glove	NA	-0.127± 0.470	NA	NA
4% CHG Larson <i>et al.</i> 1987	10	6.40-6.93	1 mL	15 sec	3 min	Glove	NA	0.29	NA	NA

**Appendix D**  
**Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutralization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0

4% CHG Babb <i>et al.</i> 1991	27	NA	5 mL + 5 mL	3 min	NA	Glove	Below Baseline at 3 hr	0.84	NA	NA
4% CHG Cremieux <i>et al.</i> 1989	35	Day 1: 6.51±0.58 Day 2: 5.44±0.46 Day 5: 5.06±0.57	5 mL + 5 mL	1 min + 3 min	5 min	Glove	NA	0.76±0.53 p=0.896	1.75±0.48	2.39±0.58 p=0.002
4% CHG Faogali <i>et al.</i> 1995	33	NA	5 mL + 5 mL	3 min + 3 min	1 min	Glove	Below Baseline at 3 hr	1.06±0.58 p<0.05	NA	1.40±1.11 p<0.05
4% CHG Bendig 1990	20	NA	5 mL+ 5 mL	1 min+ 2 min	NA	Glove	Below Baseline at 3 hr	1.55	NA	NA
4% CHG Larson <i>et al.</i> 1987	10	6.40-6.93	3 mL	15 sec	3 min	Glove	NA	0.51	NA	NA
4% CHG Larson <i>et al.</i> 1987	10	6.63	NA	15 sec	15 sec	Glove	NA	1.13	NA	NA
4% CHG Hobson <i>et al.</i> 1998	18	5.99-6.16	NA	6 min	NA	Glove	Below Baseline	1.68± 0.85	1.99± 1.69	3.43± 1.26
4% CHG Larson <i>et al.</i> 1987	10	6.20	NA	15 sec	15 sec	Glove	NA	0.71	NA	NA
4% CHG Stiles & Sheena 1985	NA	2.08	5 mL	15 sec	NA	Glove	NA	0.38	NA	NA

**Appendix D**  
**Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutralization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0
4% CHG Larson & Laughon 1987	10	5.94 ± 0.51	4 mL	15 sec	1 min	Glove	NA	0.34	NA	NA
4% CHG Hibiclens Larson & Laughon 1987	10	6.28 ± 0.60	4 mL	15 sec	1 min	Glove	NA	0.88	NA	NA
4% CHG Larson & Laughon 1987	10	5.88 ± 0.49	NA	15 sec	1 min	Glove	NA	0.20	NA	NA
4% CHG Hibiclens Pereira <i>et al.</i> 1990	34	5.154-5.404	2 mL+ 2 mL+ 2 mL+ 2 mL	Wash 1, 5 min Wash 2 etc, 3 min	1 min	Glove	Below Baseline at 2 hr	1.407	NA	NA
4% CHG Hibiclens Pereira <i>et al.</i> 1990	34	5.227-5.408	5 mL+ 5 mL	Wash 1, 3 min Wash 2 etc, 30 sec	1 min	Glove	Below Baseline at 2 hr	1.548	NA	NA

**Appendix D**  
**Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutralization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0

2% CHG Huntington 1992; Huntington 1994b	7	6.44	5 mL + 5 mL	3 min + 3 min	1 min	Media	Below Baseline	1.79	1.94	4.13
2%CHG sol'n. Paulson 1994	6	6.57	10 mL	2 min	1 min	Media	Below Baseline	0.79	2.33	3.42
2%CHG Larson <i>et al.</i> 1989 <sup>5</sup>	10	6.16±0.71	3 mL	30 sec	1 min	Glove	NA	0.28	NA	NA
2%CHG Larson <i>et al.</i> 1989 <sup>6</sup>	10	6.01±0.52	3 mL	30 sec	1 min	Glove	NA	0.28	NA	NA
2%CHG Jones <i>et al.</i> 2000	36	6.45±0.27	5 mL+ 5 mL	6 min	1 min	Glove	Below Baseline	~1.4	~1.8	~2.8
2% CHG Stiles & Sheena 1985	NA	2.00	5 mL	15 sec	NA	Glove	NA	0.30	NA	NA
2% CHG Larson & Laughon 1987	10	5.67 ± 0.54	4 mL	15 sec	1 min	Glove	NA	0.07	NA	NA

**Appendix D**  
**Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutralization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0

2% CHG FOAM ** Ballard 1998	NA	6.44	5 mL + 5 mL	3 min + 3 min	1 min	NA	Below Baseline	1.79	1.94	4.13
2% CHG Johnson Wax Undated	NA	NA	Per label directions	Per label directions	NA	NA	Below Baseline	~1.9	~2.9	~3.9
1.5% CHG *Reverdy <i>et al.</i> 1984	10	6.17±0.46	5 mL+ 5 mL	1 min+ Rub until dry	5 min	Glove	NA	0.67 (Aerobic bacteria)	NA	NA
0.5% CHG Lowbury <i>et al.</i> 1974	6	NA	5 mL+ 5 mL	~2 min	NA	Glove	NA	65.1% ±8.66	91.8%* ±2.37 Wash 6, Day 2	NA
0.5% CHG Lowbury <i>et al.</i> 1974	NA	NA	gauze application	~2 min	NA	Glove	Below Baseline at 3 hr	60.7% ±6.0	NA	NA
0.5% CHG Stuart Pharmaceuticals 1986 Rosenberg <i>et al.</i> 1976	10	NA	NA	6 min	NA	NA	Below Baseline	1.5003	1.5721	1.8692

**Appendix D**  
**Table 4: Chlorhexidine Gluconate – Surgical Scrub Studies**

- 1 The indication "5 mL + 5 mL" indicates that an initial volume of test material was used to scrub the hands for the time indicated followed by a subsequent addition of test material and scrub.
- 2 The indication "5 min + 5 min" indicates that an initial scrub time was used to scrub the hands followed by a subsequent additional scrub.
- 3 The term "Media" indicates that the neutralizers were incorporated into the dilution and plating media only.
- 4 The term "Glove" indicates that the neutralizers were incorporated into the sampling fluid in the glove.
- 5 Group washed 6x/day for 5 days
- 6 Group washed 18x/day for 5 days
- \* Data not included in the tally tables.
- \*\* Additional information provided by sponsor.  
Log reduction values below 1994 TFM criteria indicated by a shaded box and heavy outline.



**Appendix D**  
**Table 5: Alcohol – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutral-ization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0

  

Alcohol impregnated Brush *Paulson 1994	6	6.57	NA	2 min	1 min	Media	Above Baseline at 6 hr	0.20	0.86	0.49
60% n-Propanol *Ciba-Geigy 1981	15	5.16±0.15	3 mL+ 3 mL+ 3 mL+ 3 mL+ 3 mL	5 min	1 min	Glove	Below Baseline at 3 hr	2.32	NA	NA
Alcohol (Vestal Foam) *SDA/CTFA 1996	30	6.18-6.60	5g+ 2.5g	1-1.5 min + 0.5 min	1 min	Media	NA	1.87	2.24	2.36
Alcohol based (Triseptin) *Healthpoint Medical 1996	12	At least 5.18	"palm-ful"	1.5 min rinse, + 1.5 min	NA	NA	Below Baseline	2.9	3.4	4.78
Alcohol based (Triseptin) *Healthpoint Medical 1996	12	At least 5.18	"palm-ful" w/brush	1.5 min rinse, + 1.5 min	NA	NA	Below Baseline	~2.7	~3	~4.5
Alcohol based (Triseptin) *Healthpoint Medical 1996	12	At least 5.18	"palm-ful" w/ sponge	1.5 min rinse, + 1.5 min	NA	NA	Below Baseline	~2.3	~2.9	~4.3
30% ethanol wipe *Butz <i>et al.</i> 1990	12	5.75±0.425	NA	15 sec	1 min	Glove	NA	-0.008	NA	NA

**Appendix D**  
**Table 5: Alcohol – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutral-ization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0

60% ethanol Jones <i>et al.</i> 2000	36	6.45±0.27	5 mL+ 5 mL	45-75 sec + 45-75 sec	1 min	Wash 1: Media Wash 11: Glove	Below Baseline	~2.1	~2.4	~2.5
60% IPA Morrison <i>et al.</i> 1986	14	4.5-4.6 ±0.10-0.12	1 mL	10-15 sec until dry	5 sec	Glove	NA	1.4	0.5* Week 2/ Wash 2	0.5* Week 3/ Wash 3
60% IPA Larson <i>et al.</i> 1986	10	6.25	2 mL	15 sec	3 min	Glove	NA	1.34	NA	NA
60% IPA Larson <i>et al.</i> 1987	10	6.40-6.93	1 mL	15 sec dry 45 sec	3 min	Glove	NA	1.47	NA	NA
60% IPA Larson <i>et al.</i> 1987	10	6.40-6.93	3 mL	15 sec dry 45 sec	3 min	Glove	NA	1.74	NA	NA
60% IPA Larson <i>et al.</i> 1987	10	6.80	NA	15 sec	15 sec	Glove	NA	1.52	NA	NA
60% IPA Larson <i>et al.</i> 1987	10	7.06	NA	15 sec	3 min	Glove	NA	1.50	NA	NA

**Appendix D**  
**Table 5: Alcohol – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutral-ization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0
70% IPA SDA/CTFA 1995	NA	NA	NA	5 min	NA	NA	NA	2.54	NA	NA
70% IPA SDA/CTFA 1995	NA	NA	NA	5 min	NA	NA	NA	3.17	NA	NA
70% IPA SDA/CTFA 1995	NA	NA	NA	5 min	NA	NA	NA	2.99	NA	NA
70% IPA SDA/CTFA 1995	NA	NA	NA	5 min	NA	NA	NA	2.50	NA	NA
70% IPA Larson & Bobo 1992	12	5.91±0.58	5 mL	15 sec	NA	Glove	NA	0.87	NA	NA
70% IPA Larson <i>et al.</i> 1986	10	7.09	2 mL	15 sec	3 min	Glove	NA	1.2	NA	NA
70% IPA Reverdy <i>et al.</i> 1984	10	6.57±0.49	5 mL+ 5 mL	1 min+ Rub until dry	5 min	Glove	NA	1.66 (Aerobic bacteria)	NA	NA

**Appendix D**  
**Table 5: Alcohol – Surgical Scrub Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutral-ization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0
70% IPA Hough, Hoseason & Company, Ltd. Undated	10	NA	NA	NA	NA	Glove	Below Baseline at 3 hr	2.3299	NA	NA
70% IPA Lowbury <i>et al.</i> 1974	NA	NA	gauze application	~2 min	NA	Glove	Below Baseline at 3 hr	84.8% ±3.1	NA	NA
70% IPA Babb <i>et al.</i> 1991	24	NA	5 mL + 5 mL	30 sec	NA	Glove	Below Baseline at 3 hr	1.50	NA	NA
70% IPA Babb <i>et al.</i> 1991	24	NA	5 mL + 5 mL	3 min	NA	Glove	Below Baseline at 3 hr	1.65	NA	NA
70% IPA Morrison <i>et al.</i> 1986	10	4.5-4.6 ±0.10-0.12	2 mL	10 sec wash 4, 1 min	5 sec	Glove	NA	0.05	0.17* Week 2/ Wash 2	0.07* Week 3/ Wash 3
70% IPA Morrison <i>et al.</i> 1986	14	4.5-4.6 ±0.10-0.12	1 mL	10-15 sec until dry	5 sec	Glove	NA	-0.5	0.3* Week 2/ Wash 2	0.0* Week 3/ Wash 3

## Appendix D

### Table 5: Alcohol – Surgical Scrub Studies

1 "5 mL + 5 mL" indicates that the initial volume indicated of test material was used for the time indicated followed by a subsequent addition of test material and scrub.

2 The indication "5 min + 5 min" indicates that an initial scrub time was used to scrub the hands followed by a subsequent scrub.

3 The term "Media" indicates that the neutralizers were incorporated into the dilution and plating media only.

4 The term "Glove" indicates that the neutralizers were incorporated into the sampling fluid in the glove.

5 Range of values shown are for three application methods.

\* Data not included in the tally tables.

Log reduction values below the 1994 TFM criteria indicated by a shaded box and heavy outline.

## Appendix D

### Table 6: Povidone-Iodine – Surgical Scrub Studies

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutral -ization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0
7.5% PVP-I Betadine Huntington 1995	14	5.544	5 mL + 5 mL	5 min + 5 min	NA	Media	Below Baseline	1.97	1.95	1.82
7.5% PVP-I Huntington 1995	13	5.502	NA	3 min + 3 min	NA	Media	Below Baseline	2.054	2.061	3.514
7.5% PVP-I Huntington 1995	5	6.877	NA	3 min + 3 min	NA	Media	Below Baseline	1.76	2.273	1.942
7.5% PVP-I Betadine Peterson <i>et al.</i> 1978	36	6.37	5 mL + 5 mL	3 min + 3 min	NA	Media	Below Baseline	2.24	2.46	2.76
7.5% PVP-I Aly and Maibach 1988	12	>6.0	NA (Sponge/ brush)	2 min	1 min	Media	Above Baseline at 6 hr	≅1.0	≅1.0	≅1.0
7.5% PVP-I Johnson & Johnson Medical 2000	11	NA	5 mL + 5 mL	6 min + 6 min	1 min	Media	Above Baseline	1.46	1.57	1.54
7.5% PVP-I Betadine Kubista and Luskin 1979	25	NA	5 mL + 5 mL	5 min + 5 min	NA	NA	Below Baseline	1.0	NA	*1.0 Day 4
7.5% PVP-I Harrison <i>et al.</i> 1999	12	NA	NA	NA	NA	NA	Below Baseline	~1.4	~1.5	~1.5

**Appendix D**  
**Table 6: Povidone-Iodine – Surgical Scrub Studies (continued)**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutralization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0
7.5% PVP-I (Betadine) Healthpoint, Medical 1996	12	At least 5.18	Per label instructions	Per label instructions	NA	NA	Above Baseline	1.19	1.28	1.27
7.5% PVP-I FOAM Huntington 1992	NA	NA	NA	5 min + 5 min	NA	NA	NA	99.85%	99.5%	99.31%
7.5% PVP-I Peterson <i>et al.</i> 1978	36	6.37	10 mL	6 min	NA	NA	Below Baseline	2.24	2.46	2.76
7.5% PVP-I Foam Ballard 1984	17	Range: 5-7 log <sub>10</sub>	4 mL with a Brush	3 min	1 min	None	Not done	1.620	1.866 Day 3/ Scrub 3	1.956 Scrub 5
								Subject Crossover and Repeat. Values represent an average of 2 study weeks.		
7.5% PVP-I Larson & Bobo 1992	12	5.52±0.46	5 mL	15 sec	NA	Glove	NA	0.21	NA	NA

**Appendix D**  
**Table 6: Povidone-Iodine – Surgical Scrub Studies (continued)**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutralization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0
7.5% PVP-I Betadine Pereira <i>et al.</i> 1990	34	5.282-5.491	2 mL+ 2 mL+ 2 mL+ 2 mL	Wash 1, 5 min Wash 2 etc., 3 min	1 min	Glove	Below Baseline at 2 hr	1.158	NA	NA
7.5% PVP-I Betadine Pereira <i>et al.</i> 1990	34	5.198-5.300	5 mL+ 5 mL	Wash 1, 3 min Wash 2 etc., 30 sec	1 min	Glove	Below Baseline at 2 hr	0.987	NA	NA
7.5% PVP-I Babb <i>et al.</i> 1991	24	NA	5 mL+ + 5 mL	3 min	NA	Glove	Below Baseline	0.80	NA	NA
7.5% PVP-I (Betadine) Larson <i>et al.</i> 1990	12	6.18±0.39	5 mL+ 5 mL	5 min	1 min	Glove	Below Baseline	1.08	NA	1.57
4% PVP-I *Reverdy <i>et al.</i> 1984	10	6.33±0.24	5 mL+ 5 mL	1 min + 3 min	5 min	Glove	NA	1.28 (Aerobic bacteria)	NA	NA



**Appendix D**  
**Table 6: Povidone-Iodine – Surgical Scrub Studies (continued)**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutral-ization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0
0.75% available I <sub>2</sub> poloxamer *Jampani <i>et al.</i> 1998	NA	NA	NA	NA	NA	NA	Above Baseline at 6 hr	1.21	1.54	1.79
0.75% PVP-I *Stiles & Sheena 1985	NA	2.08	5 mL	15 sec	NA	Glove	NA	0.38	NA	NA
0.5% PVP-I *Stiles & Sheena 1985	NA	2.04	5 mL	15 sec	NA	Glove	NA	0.44	NA	NA
0.3% PVP-I *Stiles & Sheena 1985	NA	2.11	5 mL	15 sec	NA	Glove	NA	0.11	NA	NA
0.1% PVP-I *Stiles & Sheena 1985	NA	2.04	5 mL	15 sec	NA	Glove	NA	0.09	NA	NA
0.01% PVP-I *Stiles & Sheena 1985	NA	2.11	5 mL	15 sec	NA	Glove	NA	0.11	NA	NA

**Appendix D**  
**Table 6: Povidone-Iodine – Surgical Scrub Studies (continued)**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /hand)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Massage Time	Neutral-ization <sup>3,4</sup>	Regrowth Below Baseline	Log Reduction (Versus Baseline)		
								Scrub 1/ Day 1	Scrub 2/ Day 2	Scrub 11/ Day 5
1994 TFM	-	-	-	-	-	-	-	1.0	2.0	3.0
0.05% stabilized I <sub>2</sub> *Morrison <i>et al.</i> 1986	10	4.5-4.6 ±0.10-0.12	2 mL	10 sec	5 sec	Glove	NA	0.12	0.12 Week 2/ Wash 2	0.08 Week 3/ Wash 3
PVP-I soln. (Disadine) *Lowbury <i>et al.</i> 1974	NA	NA	gauze applica- tion	~2 min	NA	Glove	Below Baseline at 3 hr	62.3% ±5.9	NA	NA
PVP-I impregnated brush *Paulson, 1994	6	6.57	NA	2 min	1 min	Media	Below Baseline	1.84	2.56	1.52

1 The indication "5 mL + 5 mL" indicates that an initial volume of test material used to scrub the hands for the time indicated followed by a subsequent addition of test material and scrub.

2 The indication "5 min + 5 min" indicates that an initial scrub time was used followed by a subsequent scrub.

3 The term "Media" indicates that the neutralizers were incorporated into the dilution and plating media only.

4 The term "Glove" indicates that the neutralizers were incorporated into the sampling fluid in the glove.

\* Data not included in the tally tables.

Log reduction values below the 1994 TFM criteria indicated by a shaded box and heavy outline.

## Appendix D

**Table 7: Chlorhexidine Gluconate – Preoperative Preparation Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /site)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Neutral-ization <sup>3,4</sup>	Log Reduction (Versus Baseline) 30 sec	Log Reduction (Versus Baseline) <sup>5</sup>					
							10 min		30 min		6 hr	
							A	G	A	G	A	G
1994 TFM	-	-	-	-	-	1.0	2.0	3.0	-	-	Below Baseline	
1% CHG Leyden & Kligman 1981 <sup>5,6</sup>	NA	5.78-6.26/cm <sup>2</sup>	0.1 mL	NA	NA	NA	5.18 <sup>6</sup>	NA	NA	NA	Below Baseline	
4% CHG Hibiclens Aly <i>et al.</i> 1998	60	Mean 3.44±0.59 abdomen (Baseline 3 = 3.87±0.62) Mean 5.25±0.57 groin (Baseline 3 = 5.60±0.49)	10 mL	2 min + 2 min	Cup	NA	1.81 (2.24)	2.13 (2.48)	1.79 (1.91)	3.07 (3.42)	Below Baseline	
4% CHG Hibiclens Aly <i>et al.</i> 1998	20	Mean 3.08±0.59 abdomen (Baseline 3 = 3.20±0.82)	10 mL	2 min + 2 min	Cup	NA	1.98 (2.10)	NA	1.79 (1.91)	NA	Below Baseline	
4% CHG Hibiclens Vorherr <i>et al.</i> 1988	39 perineum 30 groin	5.23 P 4.64 G	50 mL+ 50 mL	2 min+ 2 min	Cup	NA	4.31P	3.81	NA	NA	Below Baseline at 3 hr	

## Appendix D

**Table 7: Chlorhexidine Gluconate – Preoperative Preparation Studies (continued)**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /site)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Neutral -ization <sup>3,4</sup>	Log Reduction (Versus Baseline) 30 sec	Log Reduction (Versus Baseline) <sup>5</sup>					
							10 min		30 min		6 hr	
							A	G	A	G	A	G
1994 TFM	-	-	-	-	-	1.0	2.0	3.0	-	-	Below Baseline	
4% CHG Purdue Frederick 1986b	NA	1.0/site	NA	NA	NA	NA	3.415	4.037	3.390	3.953	3.243	3.466
4% CHG Hibiclens Purdue Frederick 1986b	NA	1.0/site	NA	NA	NA	NA	3.046	3.472	2.743	3.595	1.624	2.280
4% CHG Hibiclens Stuart Pharmaceuticals 1986	50	NA	NA	NA	NA	NA	2.6418	NA	NA	NA	Below Baseline	
4% CHG Hibiclens Stuart Pharmaceuticals 1986	50	NA	NA	NA	NA	NA	NA	3.7641	NA	4.1581	NA	
4% CHG Hibiclens Stuart Pharmaceuticals 1986	50	NA	NA	NA	NA	NA	NA	3.6402	NA	3.5635	NA	
4% CHG Hibiclens Stuart Pharmaceuticals 1986	50	NA	NA	NA	NA	NA	4.9532	NA	NA	NA	Below Baseline	

## Appendix D

**Table 7: Chlorhexidine Gluconate – Preoperative Preparation Studies (continued)**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /site)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Neutral-ization <sup>3,4</sup>	Log Reduction (Versus Baseline) 30 sec	Log Reduction (Versus Baseline) <sup>5</sup>					
							10 min		30 min		6 hr	
							A	G	A	G	A	G
1994 TFM	-	-	-	-	-	1.0	2.0	3.0	-	-	Below Baseline	

4% CHG Hibiclens Stuart Pharmaceuticals 1986	50	NA	NA	NA	NA	NA	2.5322	NA	NA	NA	Below Baseline	
4% CHG Hibiclens Stuart Pharmaceuticals 1986	50	NA	NA	NA	NA	NA	NA	3.4808	NA	3.3298	NA	

- 1 The indication "5 mL + 5 mL" indicates that an initial volume of test material was used to scrub the hands for the time indicated followed by a subsequent addition of test material and scrub.
  - 2 The indication "5 min + 5 min" indicates that an initial scrub time was used to scrub the hands followed by a subsequent scrub.
  - 3 The term "Media" indicates that the neutralizers were incorporated into the dilution and plating media only.
  - 4 The term "Cup" indicates that the neutralizers were incorporated into the sampling fluid in the cup.
  - 5 Elaborated flora-skin occluded to increase flora for test-log reductions calculated vs. control site
  - 6 Forearm site
  - 7 Different authors calculate reductions versus baseline in different manners.
- Log reduction values below the 1994 TFM criteria indicated by a shaded box and heavy outline.

**Appendix D**  
**Table 8: Alcohol – Preoperative Preparation Studies (continued)**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /site)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Neutralization <sup>3,4</sup>	Log Reduction (Versus Baseline) 30 sec	Log Reduction (Versus Baseline) <sup>8</sup>					
							10 min		30 min		6 hr	
							A	G	A	G	A	G
1994 TFM	-	-	-	-	-	1.0	2.0	3.0	-	-	Below Baseline	

  

70% IPA SDA/CTFA 1995	NA	3.02	Saturated gauze	1 min	NA	2.25	NA	NA	NA	NA	Below Baseline at 6 hr	
70% IPA SDA/CTFA 1995	NA	3.45	Saturated gauze	1 min	NA	2.25	NA	NA	NA	NA	NA	
70% IPA SDA/CTFA 1995	NA	3.66	Saturated gauze	5 min	NA	2.95	NA	NA	NA	NA	NA	
70% IPA SDA/CTFA 1995	NA	3.60	Saturated gauze	5 min	NA	2.18	NA	NA	NA	NA	NA	
70% IPA Gunderman <i>et al.</i> 1985	NA	NA	NA	NA	Media	1.58	1.58	NA	NA	NA	Below Baseline at 3 and 24 hr	
70% IPA Leyden <i>et al.</i> 1996 <sup>5,6,7</sup>	10	NA	50μl/ 10 cm <sup>2</sup>	NA	Media	NA	5.2	NA	NA	NA	Below Baseline	
60% IPA Leyden & Kligman 1981 <sup>5,6</sup>	NA	5.78-6.26/cm <sup>2</sup>	0.1 mL	NA	NA	NA	3.25	NA	NA	NA	Below Baseline	
60% IPA Gunderman <i>et al.</i> 1985	NA	NA	NA	NA	Media	1.45	1.35	NA	NA	NA	Below Baseline at 3 and 24 hr	
60% n-propanol *Leyden & Kligman 1981 <sup>5,6</sup>	NA	5.78-6.26/cm <sup>2</sup>	0.1 mL	NA	NA	NA	3.55	NA	NA	NA	Below Baseline	

**Appendix D**  
**Table 8: Alcohol – Preoperative Preparation Studies (continued)**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /site)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Neutralization <sup>3,4</sup>	Log Reduction (Versus Baseline) 30 sec	Log Reduction (Versus Baseline) <sup>8</sup>					
							10 min		30 min		6 hr	
							A	G	A	G	A	G
1994 TFM	-	-	-	-	-	1.0	2.0	3.0	-	-	Below Baseline	

  

70% ethanol Leyden & Kligman 1981 <sup>5,6</sup>	NA	5.78-6.26/cm <sup>2</sup>	0.1 mL	NA	NA	NA	3.88	NA	NA	NA	Below Baseline	
60% ethanol Jampani <i>et al.</i> 2000	14	~4, Groin ~2.7 Abdomen	NA	5 min	Media	NA	2.3	3.12	NA	NA	Below Baseline	
60% ethanol Jampani <i>et al.</i> 2000	4	~4, Groin ~2.7 Abdomen	NA	30 sec	Media	NA	2.77	2.04	NA	NA	Below Baseline	

- 1 The indication "5 mL + 5 mL" indicates that an initial volume of test material was used to scrub the hands for the time indicated followed by a subsequent addition of test material and scrub.
  - 2 The indication "5 min + 5 min" indicates that an initial scrub time was used to scrub the hands followed by a subsequent scrub.
  - 3 The term "Media" indicates that the neutralizers were incorporated into the recovery media.
  - 4 The term "Cup" indicates that the neutralizers were incorporated into the sampling fluid in the cup.
  - 5 Elaborated flora-skin occluded to increase flora for test-log reductions calculated vs. control site
  - 6 Forearm site
  - 7 Different authors calculate reductions in different manners.
  - \* Not included in the Tally Tables
- Log reduction values below 1994 TFM criteria indicated by a shaded box and heavy outline.

**Appendix D**  
**Table 9: Povidone-Iodine – Preoperative Preparation Studies**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /site)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Neutralization <sup>3,4</sup>	Log Reduction (Versus Baseline) 30 sec	Log Reduction (Versus Baseline) <sup>8</sup>					
							10 min		30 min		6 hr	
							A	G	A	G	A	G
1994 TFM	-	-	-	-	-	1.0	2.0	3.0	-	-	Below Baseline	

5% PVP-I Jeng & Severin 1998	12	>5, Groin >3 Abdomen	NA	30 sec	Media	NA	~2.8	~3	~3	~4.3	Below Baseline	
7.5% PVP-I Jampani <i>et al.</i> 2000	14	Ab ~2.7/cm <sup>2</sup> Groin ≥4/cm <sup>2</sup>	NA	5 min	Media	NA	1.84	1.97	NA	NA	Below Baseline at 4 hr	
7.5% PVP-I Arata <i>et al.</i> 1993	14	3.16	NA	NA	Cup	NA	1.17 (unspecified time)	NA	NA	NA	NA	
10% PVP-I Malathi <i>et al.</i> 1993	5	~1.78/cm <sup>2</sup>	Swab	10 sec	Media	~1.78	NA	NA	NA	NA	NA	
10% PVP-I Betadine Vorherr <i>et al.</i> 1988	45 perineum 35 groin	4.91 P 3.99 G	50 mL+ 50 mL	2 min+ 2 min	Cup	NA	3.74P	3.66	NA	NA	Below Baseline at 3 hr	
10% PVP-I Gundermann <i>et al.</i> 1985	NA	NA	NA	NA	Media	1.36 (60 sec)	1.06	NA	NA	NA	Below Baseline at 3 and 24 hr	
10% PVP-I Betadine Vorherr <i>et al.</i> 1988	47 perineum 44 groin	4.91 P 3.99 G	50 mL+ 50 mL	2 min+ 2 min	Cup	NA	3.65P	3.42	NA	NA	Below Baseline at 3 hr	
10%PVP-I Leyden <i>et al.</i> 1996 <sup>5,6,7</sup>	10	NA	50μl/ 10 cm <sup>2</sup>	NA	Cup	NA	5.36	NA	NA	NA	Below Baseline	



## Appendix D

**Table 9: Povidone-iodine – Preoperative Preparation Studies (continued)**

Formulation	Test Subjects	Resident Flora Baseline (log <sub>10</sub> /site)	Scrub Vol. <sup>1</sup>	Scrub Time <sup>2</sup>	Neutralization <sup>3,4</sup>	Log Reduction (Versus Baseline) 30 sec	Log Reduction (Versus Baseline) <sup>8</sup>					
							10 min		30 min		6 hr	
							A	G	A	G	A	G
1994 TFM	-	-	-	-	-	1.0	2.0	3.0	-	-	Below Baseline	
10% PVP-I Betadine Malathi <i>et al.</i> 1993 <sup>9</sup>	5	<0.70-2.78 (10 control subjects)	Moist swab	10 sec	Cup	98.3%	NA	NA	NA	NA	NA	
PVP-I Betadine Scrub *Leyden & Kligman 1981 <sup>5,6</sup>	NA	6-7/cm <sup>2</sup>	0.1 mL	NA	NA	NA	2.99	NA	NA	NA	Below Baseline	
Betadine *Jeng & Severin 1998	12	>5, Groin >3, Abdomen	NA	5 min	Media	NA	1.2	3.5	2.6	~3.7	Below Baseline	
Betadine *Major <i>et al.</i> 1993	10	~1.57 >0-<2	NA	NA	None	~1.52 >0-<2	NA	NA	NA	NA	NA	
PVP-I Scrub/PVP-I + ROH *Traore <i>et al.</i> 2000	22	NA	NA	NA	NA	1.5 (30 sec)	2.1 (3 min)	NA	NA	NA	Below Baseline at 2 hr	

- 1 The indication "5 mL + 5 mL" indicates that an initial volume of test material was used to scrub the hands for the time indicated followed by a subsequent addition of test material and scrub.
  - 2 The indication "5 min + 5 min" indicates that an initial scrub time was used to scrub the hands followed by a subsequent scrub.
  - 3 The term "Media" indicates that the neutralizers were incorporated into the dilution and plating media only.
  - 4 The term "Cup" indicates that the neutralizers were incorporated into the sampling fluid in the cup.
  - 5 Elaborated flora-skin occluded to increase flora for test-log reductions calculated vs. control site
  - 6 Forearm site
  - 7 Flora transferred from perineum & elaborated by occlusion
  - 8 Different authors calculate reductions in different manners.
  - 9 Sites tested were on the back.
  - P Sampled Perineum
  - \* Data not included in tally tables.
- Log reduction values below the 1994 TFM criteria indicated by a shaded box and heavy outline.

**Appendix D**  
**Table 9: Povidone-iodine – Preoperative Preparation Studies (continued)**

# Log reduction values below the 1994 TFM criteria indicated by a shaded box and heavy outline.

**Appendix E**  
**Table 1: Triclosan – Healthcare Personnel Handwash Studies**

Formula- tion	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time <sup>2</sup>	Rinse Time	Massage Time	Neutri- zation <sup>3,4</sup>	Statistical Signif. vs. baseline	Log Reduction <sup>6</sup> (Versus Baseline)			
		Base- line (log <sub>10</sub> / hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

1.5% Triclosan Bartzokas <i>et al.</i> , 1987	12	6.66 ± 0.35	5 mL	45 sec	1 min	3 mL + 3 mL	30 sec + 30 sec	30 sec	1 min	Glove	NA	2.91 ± 0.42	3.22 ± 0.41	3.50 ± 0.52	3.78 ± 0.47
1.0% Triclosan Johnson, 1998b	12	NA	5 mL	45 sec	2 min	5 mL	15 sec	30 sec	1 min	Media	NA	1.97	NA	NA	1.89
1.0% Triclosan Jampani <i>et al.</i> , 1998 Johnson, 1998 <sup>2</sup>	12	9.04	2.5 mL + 2.5 mL	45 sec	2 min	5 mL	30 sec	30 sec	1 min	Media	p<0.05	2.28	NA	NA	2.79

**Appendix E**  
**Table 2: PCMX – Healthcare Personnel Handwash Studies**

Formula- tion	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time <sup>2</sup>	Rinse Time	Massage Time	Neutri- zation <sub>3,4</sub>	Statistical Signif. vs. baseline	Log Reduction <sup>6</sup> (Versus Baseline)			
		Base- line (log <sub>10</sub> / hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0
1.0% Triclosan Jampani <i>et al.</i> , 1998; Johnson 1998 a	8	8.46 ± 0.28	5 mL	45 sec	Air dry	5 mL	15 sec	30 sec	1 min	Wash1: Media Wash 10: Glove	p<0.05	2.13 ± 0.38	NA	NA	2.14 ± 0.47
1.0% Triclosan Jampani <i>et al.</i> , 1998; Johnson, 1998	6	8.46 ± 0.28	5 mL	45 sec	2 min	5 mL	15 sec	30 sec	1 min	Wash1: Media <sup>3</sup> Wash 10: Glove	p<0.05	1.74	NA	NA	1.63
1.0% Triclosan Ciba-Geigy, 1995	12	NA	5 mL	45 sec	2 min	5 mL	15 sec	30 sec	1 min	Glove Wash 10	NA	2.54	2.45 Wash 3	2.61	2.61
1.0% Triclosan Ciba-Geigy, 1990	12	NA	NA	NA	NA	3 mL	30 sec	NA	NA	Glove	NA	~2.54	~3.04	~3.31	~3.72
0.5% Triclosan Johnson, 1998b	12	NA	5 mL	45 sec	2 min	5 mL	15 sec	30 sec	1 min	Media	NA	1.95	NA	NA	1.57
0.5% Triclosan ConvaTec, 1995; Calgon Vestal,1993	30	10.41	NA	NA	1 min	1.5 mL	30 sec	NA	1 min	NA	p=0.05	2.31	2.50 Wash 3	2.57	2.53
0.3% Triclosan Huntington, 1995	6	8.49	5 mL	45 sec	2 min	5 mL	60 sec	30 sec	1 min	Media	NA	1.74	1.98	1.93	1.93

**Appendix E**  
**Table 2: PCMX – Healthcare Personnel Handwash Studies**

Formulation	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time <sup>2</sup>	Rinse Time	Massage Time	Neutralization <sup>3,4</sup>	Statistical Signif. vs. baseline	Log Reduction <sup>6</sup> (Versus Baseline)			
		Base-line (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0
0.3% Triclosan Stiles & Sheena, 1987	4	3.88	NA	NA	NA	NA	15 sec	15-20 sec	NA	Media	NA	2.30	NA	NA	NA
0.3% Triclosan Stiles & Sheena, 1987	4	3.83	NA	NA	NA	NA	15 sec	15-20 sec	NA	Media	NA	2.39	NA	NA	NA
0.3% Triclosan SDA/CTFA, 1995	NA	NA	NA	NA	NA	NA	30 sec	NA	NA	NA	NA	2.50	2.93 Wash 2	3.05 Wash 3	2.77

**Appendix E**  
**Table 2: PCMX – Healthcare Personnel Handwash Studies**

Formula- tion	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time <sup>2</sup>	Rinse Time	Massage Time	Neutrali- zation <sup>3,4</sup>	Statistical Signif. vs. baseline	Log Reduction <sup>6</sup> (Versus Baseline)			
		Base- line (log <sub>10</sub> / hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0
0.3% Triclosan Gojo, 1999	18	9.0	NA	NA	NA	NA	30 sec	NA	NA	NA	NA	2.84	2.93	3.0	3.04
0.3% Triclosan Sheena & Stiles, 1983 <sup>5</sup>	NA	2.80	NA	5 sec, until dry	5 mL	15 sec	NA	NA	NA	NA	NA	1.32	NA	NA	NA
0.3% Triclosan Sheena & Stiles, 1983 <sup>5</sup>	NA	3.04	NA	5 sec, until dry	5 mL	15 sec	NA	NA	NA	NA	NA	NA	NA	NA	1.74 Day 3, Wash 6
0.3% Triclosan Gojo, 1999	18	9.00	NA	NA	NA	NA	30 sec	NA	NA	NA	NA	2.84	2.93 Wash 3	3.00	3.04
0.25% Triclosan Johnson, 1998b	12	NA	5 mL	45 sec	2 min	5 mL	15 sec	30 sec	1 min	Media	NA	1.94	NA	NA	1.75
0.25% Triclosan Sheena & Stiles, 1983 <sup>5</sup>	NA	2.83	NA	5 sec, until dry	5 mL	15 sec	NA	NA	NA	NA	NA	1.23	NA	NA	NA
0.25% Triclosan Sheena & Stiles, 1983 <sup>5</sup>	NA	2.76	NA	5 sec, until dry	5 mL	15 sec	NA	NA	NA	NA	NA	NA	NA	NA	1.45 Day 3, Wash 6

**Appendix E**  
**Table 2: PCMX – Healthcare Personnel Handwash Studies**

Formula- tion	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time <sup>2</sup>	Rinse Time	Massage Time	Neutri- zation <sub>3,4</sub>	Statistical Signif. vs. baseline	Log Reduction <sup>6</sup> (Versus Baseline)			
		Base- line (log <sub>10</sub> / hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0
0.25% Triclosan Johnson, 1998b Ciba-Geigy, 1995	12	NA	5 mL	45 sec	2 min	5 mL	15 sec	30 sec	1 min	Glove Wash 10	NA	2.03	1.80 Wash 3	1.95	1.75
0.1% Triclosan Johnson, 1998b	12	NA	5 mL	45 sec	2 min	5 mL	15 sec	30 sec	1 min	Media	NA	1.67	NA	NA	1.50
Triclosan *Stepan Company Undated	NA	NA	NA	NA	2 min	NA	NA	NA	NA	NA	NA	~1.2	~1.5 Wash 5	NA	~1.5
Triclosan *SDA/CTFA, 1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.82	NA	1.58 Wash 5	1.75

- 1 The indication "5 mL + 5 mL" indicates that an initial volume of test material was used to scrub the hands for the time indicated followed by a subsequent addition of test material and scrub.
- 2 The indication "5 min + 5 min" indicates that an initial scrub time was used to scrub the hands followed by a subsequent scrub.
- 3 The term "Media" indicates that the neutralizers were incorporated into the dilution and plating media only.
- 4 The term "Glove" indicates that the neutralizers were incorporated into the sampling fluid in the glove.
- 5 *E. coli* inoculated onto hands through artificially contaminated ground beef.
- Data not included in the Tally Table
- 6 Log reduction values below the 1994 TFM criteria indicated by a shaded box.

**Appendix E**  
**Table 2: PCMX – Healthcare Personnel Handwash Studies**

Formulation	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time <sup>2</sup>	Rinse Time	Massage Time	Neutral-ization <sup>3,4</sup>	Statistical Signif. vs. baseline	Log Reduction <sup>6</sup> (Versus Baseline)			
		Base-line (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

3% PCMX Huntington 1995	6	7.630	6 mL	NA	1 min	5 mL	15 sec	NA	1 min	Glove	NA	2.943	>3.130	>3.130	>3.130
2.5% PCMX Paulson, 1994	5	7.98 ± 0.27	5 mL	1 min	1 min	3 mL	20 sec	30 sec	1 min	Media	p<0.05	1.99 ± 0.12	2.81 ±0.41	3.72 ±0.43	3.99 ±.59
1% PCMX SDA/CTFA 1995	NA	NA	6 mL	NA	NA	5 mL	15 sec	NA	NA	NA	NA	2.39	NA	NA	NA
1% PCMX *SDA/CTFA 1995	NA	NA	6 mL	NA	NA	5 mL	15 sec	NA	NA	NA	NA	NA	2.87 Wash 5	NA	NA
1% PCMX SDA/CTFA 1995	NA	NA	6 mL	NA	NA	5 mL	15 sec	NA	NA	NA	NA	NA	NA	NA	3.06



**Appendix E**  
**Table 2: PCMX – Healthcare Personnel Handwash Studies (continued)**

Formulation	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time <sup>2</sup>	Rinse Time	Massage Time	Neutralization <sup>3,4</sup>	Statistical Signif. vs. baseline	Log Reduction <sup>6</sup> (Versus Baseline)			
		Base-line (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

1% PCMX SDA/CTFA 1995	NA	NA	6 mL	NA	NA	5 mL	15 sec	NA	NA	NA	NA	NA	NA	NA	0.69 (vs. control soap)
0.6% PCMX Huntington 1995	NA	7.972	5 mL	NA	2 min	1 mL	15 sec	NA	1 min	Glove	NA	NA	NA	NA	1.552
						2 mL									1.622
						3 mL									1.469
						4 mL									1.611
						5 mL									1.629
0.6% PCMX Huntington 1995	6	8.613	5 mL	NA	2 min	2 mL	30 sec	NA	1 min	Glove	NA	2.603	2.775	3.050	3.502
0.6% PCMX Johnson Wax Undated	NA	7.58	NA	NA	NA	NA	NA	NA	NA	NA	NA	~1.5	~1.4 Wash 3	~1.7	~1.7
0.6% PCMX Paulson, 1994	5	7.98 ±0.27	5 mL	1 min	1 min	3 mL	20 sec	30 sec	1 min	Media	p<0.05	2.5 ± 0.22	2.73 ±0.04 Wash 3	2.9 ±0.63	2.76 ± 0.27

**Appendix E**  
**Table 2: PCMX – Healthcare Personnel Handwash Studies (continued)**

Formulation	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time <sup>2</sup>	Rinse Time	Massage Time	Neutralization <sup>3,4</sup>	Statistical Signif. vs. baseline	Log Reduction <sup>6</sup> (Versus Baseline)			
		Base-line (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

0.6% PCMX Paulson <i>et al.</i> , 1999	5	7.98 ± 0.27	5 mL	NA	1 min	3 mL	20 sec	30 sec	1 min	Media	NA	2.50 ±0.22	2.73 ±0.41	2.91 ±0.63	2.76 ±0.27
0.53% PCMX SDA/CTFA 1995	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.69 Wash 5	NA	2.56
0.5% PCMX SDA/CTFA 1995	NA	NA	NA	NA	NA	NA	30 sec	NA	NA	NA	NA	1.92	2.78 Wash 5	NA	3.21
0.5%PCMX SDA/CTFA 1995	NA	NA	NA	NA	NA	NA	30 sec	NA	NA	NA	NA	1.68	1.91 Wash 3	2.26	2.37
0.5% PCMX Gojo, 1999	18	9.17	NA	NA	NA	NA	30 sec	NA	NA	NA	NA	1.86	2.17 Wash 3	2.42	2.62
0.325% PCMX Sheena & Stiles, 1983 <sup>5</sup>	NA	2.70	NA	5 sec	Until dry	5 mL	15 sec	NA	NA	NA	NA	1.40	NA	NA	NA
0.325% PCMX Sheena & Stiles, 1983 <sup>5</sup>	NA	2.53	NA	5 sec	Until dry	5 mL	15 sec + 15 sec	NA	NA	NA	NA	NA	1.53	NA	NA

**Appendix E**  
**Table 2: PCMX – Healthcare Personnel Handwash Studies (continued)**

Formulation	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time <sup>2</sup>	Rinse Time	Massage Time	Neutral-ization <sup>3,4</sup>	Statistical Signif. vs. baseline	Log Reduction <sup>6</sup> (Versus Baseline)			
		Base-line (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

0.3% PCMX Gojo, 1999	18	9.22	NA	NA	NA	NA	30 sec	NA	NA	NA	NA	2.57	2.66 Wash 3	2.69	2.83
0.3% PCMX SDA/CTFA 1995	NA	NA	NA	NA	NA	NA	30 sec	NA	NA	NA	NA	2.69	2.93 Wash 5	NA	3.46
0.3% PCMX SDA/CTFA 1995	NA	NA	NA	NA	NA	NA	30 sec	NA	NA	NA	NA	2.40	2.82 Wash 3	2.73	2.31
PCMX based *Johnson Wax Undated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	~1.5	NA	NA	NA

**Appendix E**  
**Table 2: PCMX – Healthcare Personnel Handwash Studies (continued)**

Formula-tion	Test Subjects	S. marcescens				Wash Vol. <sup>1</sup>	Wash Time <sup>2</sup>	Rinse Time	Massage Time	Neutral-ization <sup>3,4</sup>	Statistical Signif. vs. baseline	Log Reduction <sup>6</sup> (Versus Baseline)			
		Base-line (log <sub>10</sub> /hand)	Vol.	Rub Time	Dry Time							Wash No.			
												1	4	7	10
1994 TFM	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	3.0

PCMX *Acute Kare Stuart Pharma- ceuticals, 1986	16	NA	6 mL	NA	1 min	15 sec	NA	NA	NA	NA	NA	~2.4	~2.9 Wash 5	NA	~3
PCMX impreg-nated brush Hibiclens *Paulson, 1994	36	6.5144	NA	NA	NA	5 mL	30 sec	NA	NA	NA	NA	NA	3.6928 Wash 5	NA	4.3192

1The indication "2.5 mL + 2.5 mL" indicates that two additions of test material were used to reduce the loss through the subject's fingers.

2 The indication "5 min + 5 min" indicates that an initial scrub time was used to scrub the hands followed by a subsequent scrub.

3 The term "Media" indicates that the neutralizers were incorporated into the dilution and plating media only.

4 The term "Glove" indicates that the neutralizers were incorporated into the sampling fluid in the glove.

5. *E. coli* inoculated onto hands through artificially contaminated ground beef.

\* Data is not included in the tally tables.

6 Log reduction values below the 1994 TFM criteria indicated by a shaded box.